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Cover

This is the American crew patch of the joint U.S.A.-USSR Apollo Soyuz Test Project (ASTP) scheduled for launch July 15, 1975. Outlined in red, the patch carries the names of the three American astronauts and the two Soviet cosmonauts.

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Letter from Washington

Dear Colleagues:

As we end the first quarter of a year in a depressed economy with high unemployment and a sharp decline in the general level of business activity, it is heartening to note that 1975 will be one of NASA's busiest and most productive years.

Dr. James C. Fletcher

Twenty-eight launches are scheduled for calendar year 1975. Of the total, 18, or 65 percent, are experimental or operational *applications* satellites. Also, 14, or 50 percent, of the 28 launches are *reimbursable* and not paid for out of NASA's appropriations.

These figures illustrate the degree to which the space program is now oriented to practical applications. They also show that the space age has now arrived at the point where the use of satellites is accepted as a means of providing beneficial services which are economically profitable.

On the list, too, are important scientific satellites and, during the busy months ahead, we will have one spectacular mission, the Apollo Soyuz Test Project. It will give us the kind of visibility we have enjoyed in the past. But, more importantly, this mission is a milestone in international relations and detente.

Following the ASTP are the two Viking launches, which are scheduled to soft-land spacecraft on Mars, a scientific highlight of 1976, the nation's Bicentennial year.

The success of past projects gives each of us a sense of accomplishment and pride. However, we are now going through a transitional program. We have essentially the same people we had before but we have different goals. We have to understand these goals, meet them and still be known as the "can-do" organization we were before, but perhaps in a less visible way.

Landing on the Moon is a hard act to follow, but we have a lot of other things to do which are just as important—if not more so—to all Americans. We must keep reminding ourselves of that from time to time: that we work for all Americans—more than 200 million of them.

Therein lies the strength of American society: that we in government respond to public opinion, public need, public interest and that, in so doing, we have been and are successfully conducting our programs within severe financial constraints.

The last issue of NASA ACTIVITIES detailed our FY 1976 budget figures. The total budget figure submitted was at the $3.4 billion level; however, when measured in FY 1973 equivalent dollars, the FY 1976 budget request corresponds to only about $2.8 billion.

Notwithstanding the 28 launches scheduled, the FY 1976 budget, for the first time in at least a dozen years, contains *no new program starts*. This is in accordance with the President's government-wide policy of no new programs this year except in the energy field.

Our entire FY 1976 authorization request, therefore, is for continuing and extending previously approved programs. Although it is up about $300 million from FY 1975, about $200 million of this is the built-in net increase required for on-going program commitments presented in FY 1975. This means that on an overall basis we have an effective increase of only about $100 million, much less than the current rate of inflation.

On a positive note, however, I am able to say that our FY 1976 budget will permit us to proceed with all of our presently approved programs generally as planned.

Of special interest and significance besides the 28-launch schedule are:

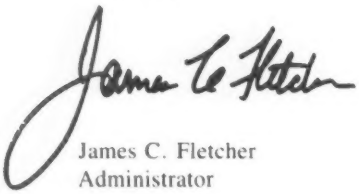
- *Space Shuttle* development will proceed on the present schedule, pointed to a first manned orbital flight of the reusable vehicle in mid-1979.
- LANDSAT-C *(formerly* ERTS-C) will proceed and is scheduled for launch in the fall of 1977. LANDSAT-3 will be NASA's third experimental earth resources satellite. It will test improved sensors and complete the experimental demonstrations in crop surveys, water resources management and many other fields.
- *Aircraft energy reduction* will continue as a principal focus in our aeronautics research and technology work. We have identified technologies which have the potential in the next 10 years to reduce the fuel requirements of commercial jet aircraft by 50 percent. If these advances are achieved by 1985 and could be incorporated in the number of U.S. commercial aircraft flying today, the savings in crude oil requirements would be about one-third of a million barrels per day. With the expected growth in air traffic, the savings could approach a million barrels a day in the 1990s.
- *Problems of the atomosphere*, including the effects of pollutants that might adversely affect our environment, will continue to be studied in a coordinated effort with other agencies.
- Even though we do not have any new program starts in the FY 1976 budget, we will continue study and advanced technology development for projects to be started in future years. In science, applications, and

aeronautics there will be special emphasis on planning and preliminary work on the experiments and applications to be carried out on the Space Shuttle and Spacelab missions in the early 1980s.

Our mandate is simple and clear: we must accomplish what we have set out to do—doing it with reduced funds and maximum efficiency.

So, I challenge each of you to give your best to make this our finest year.

Sincerely,



James C. Fletcher
Administrator

ASTP Launch Vehicle Stacked

The Saturn IB launch vehicle to be used in the Apollo Soyuz Test Project launch July 15 has been stacked on its mobile launcher inside the Vehicle Assembly Building at the Kennedy Space Center.

A boilerplate unit simulating the Apollo command module was temporarily stacked atop the launch vehicle, designated SA-210, developed under direction of the Marshall Space Flight Center. The boilerplate will be removed and the actual spacecraft erected on March 18.

The complete Saturn vehicle will be transferred on March 24 from the Vehicle Assembly Building to launch Complex 39, Pad B, where final preparations for launch will begin.

Goddard Essay Award Opened

The National Space Club has announced the opening of the Robert H. Goddard Historical Essay Award competition for 1975.

Open to any U.S. citizen, the contest, named in honor of the world rocket pioneer, involves a $500 honorarium and a National Space Club Certificate. It was the first literary competition devoted to historical affairs in the field of rocketry and astronautics.

Essays may treat with any significant aspects of the historical development of rocketry and astronautics, and will be judged on their originality and scholarship.

Entries should be submitted by Nov. 1, 1975, to the Goddard Historical Essay Contest, % National Space Club, 1629 K Street N.W., Washington, DC 20006.

Monthly NASA Highlights

Synchronous Meteorological Satellite Launched

The second Synchronous Meteorological Satellite (SMS-B) was successfully launched on Feb. 6, 1975, from Cape Canaveral by a Delta launch vehicle. The Delta 2914 is a three-stage launch vehicle equipped with an inertial guidance system which controls the vehicle and sequence of operations from liftoff to spacecraft separation. Launch vehicle performance was nominal.

The SMS-B is the second of a series of operational prototype spacecraft developed by NASA for the Department of Commerce. Upon completion of the in-orbit evaluation and checkout phase, operational control of the spacecraft was turned over to the National Oceanic and Atmospheric Administration/National Environmental Satellite System to provide regular and useful daytime and nighttime meteorological observations on March 10.

The SMS-2 will provide weather coverage of the Western U.S., including Hawaii, while SMS-1, launched in May, 1974, provides coverage of the Eastern U.S.

LANDSAT-2 Now in Operation

The LANDSAT-2 spacecraft, launched on Jan. 22, 1975, has been checked out and is now in operation extending the coverage of LANDSAT-1. All systems are operating normally and good data are being received. The two spacecraft are 180 degrees apart in orbit and can view the same local area with the same Sun angle every nine days.

One experiment which will utilize LANDSAT-2 data is a joint investigation by the Department of Agriculture, the National Oceanic and Atmospheric Administration, and NASA. The Large Crop Inventory Experiment (LACIE) will evaluate to what extent the computer-analyzed multispectral remote sensing data can improve the timeliness and accuracy of crop forecasting. Other experiments in water management, agriculture, land use planning and monitoring ice conditions in navigable lakes will further demonstrate the practical benefits to resources management of multispectral remote sensing from space.

Earth Resources Data Aids Foreign Participants

The Earth resources satellite is proving to be a valuable tool in global remote sensing. There has been increasing foreign interest in ground facilities to receive and process data from LANDSAT-type satellites as the use of the data for practical applications also increases. Some of the benefits to foreign participants have been demonstrated, and with the launch of LANDSAT-2, more are expected.

Local officials in Pakistan used the LANDSAT imagery taken before and during recent floods to assess the extent of flooding. The information imagery also contributed in settling disputed claims of farmers attempting to reclaim their crop lands.

LANDSAT imagery in Bolivia detected a geological fault across the planned route of a natural gas pipeline. A revised route, both shorter and less expensive to construct, was selected based on LANDSAT data.

In Japan, LANDSAT data is being used to monitor water pollution in the Osaka Bay area. Because of the existing strong tidal currents in the Bay area, conventional monitoring techniques were ineffective.

LANDSAT imagery of the Republic of Niger indicated a large area of land with enhanced vegetation cover and soil moisture. A study of the area revealed it was a fenced-in ranch where a grazing management program had been initiated. Range management techniques such as this may help reverse spread of the Sahara to the South.

In Northeast Thailand, LANDSAT imagery has been used in the planning of agriculture development and irrigation projects. From the data, estimates can be made of the available water supply and seasonal fluctuations in that supply.

ATS-6 Beams State of the Union Message to Alaska

For the first time, the people of the Alaskan Bush were able to see the President's State of the Union message in real time. Through the assistance of the Veterans Administration and the Federation of Rocky Mountain States, a link was established between national TV coverage and the Alaskan Health Education Telecommunications (HET) network providing real time coverage at 19 Health Education Telecommunication (HET) sites in Alaska.

Following this "first", ATS-6 and the Alaska HET network provided live coverage of the inauguration of Governor Hammond on Jan. 19 and the Governor's State of the State address on Jan. 21. These events were the first time that citizens of Alaska had the opportunity to see "history in the making via satellite."

Space Technology Used in Hospital

In a hospital at Huntsville, AL, space scientists have equipped a hospital room with a variety of remote control devices adapted for use by paralyzed or disabled patients. The electromechanical systems, developed for both manned and unmanned space missions, perform functions for environmental control, comfort and convenience of the patient.

A severely handicapped patient can now make and answer telephone calls, change radio and TV channels and control the volume, adjust the position of the bed, open and close curtains, call the nurse, and a variety of other tasks which up to now had to be performed for the patient. This is possible by using one of several systems installed in the specially-equipped room. One device is a "sight switch" which is mounted in a special pair of glasses and is activated by eye movements. Another is a breath switch where the patient's breath activates the system. Several ultrasensitive switches are also being used and are activated by applying a very slight manual pressure which even the very severely handicapped person can do.

All of these devices are installed in the hospital room and are being tested to demonstrate how space technology can be modified and used for the comfort and recreation of bedridden patients.

Airborne Laser Bathymetry Used to Plot the Ocean Bottom

In August, 1974, a joint NASA/Naval Oceanographic Office team flight tested the first pulsed laser bathymeter off the coast at Key West, FL, and produced the first ocean bottom profile chart by this means. Using a neon ion laser fired at 10 pulses per second with a peak power of 1.8 kilowatts, the runs were made at a plane altitude of 500 feet, at a cruising speed of 150 knots.

The bathymeter operates on the principle of an optical radar—a pulse of laser light is transmitted downwards and, from the time interval between the surface reflection signal and the bottom reflection signal, the depth is calculated.

Sea truth data was obtained by shipborne sonar-techniques, and these results were in excellent agreement with the laser bathymetric data. Depths as low as 66 feet were obtained and the resolution of the bottom was clearly defined.

A comparison of the two methods showed the laser technique to be about 20 times faster than the sonar and the area coverage to be about 13 times greater. Furthermore, the laser method was capable of measuring depths in areas that were hazardous to the sonar craft.

Fusion-Related Research in NASA

Fusion energy may in the future be the "work-horse" of space—for propelling large manned spacecraft throughout the solar system, for providing electrical power for space colonies, and for beaming energy back to Earth.

Energy produced from fusion reaction may provide the long-range solution to energy needs on Earth. The fuel used to produce fusion reactions, deuterium or heavy hydrogen extracted from sea water, is abundant and cheap. The fusion reactions produce none of the radioactive fission products created in conventional nuclear power plants. These advantages and others are the reasons for the support given to large-scale research programs on controlled thermonuclear fusion. Sometime during this decade, a fusion research device will be operated where more fusion energy is produced than is required to heat the fuel to the millions of degrees required for thermonuclear "burning".

NASA has supported research related to the use of fusion energy in space missions under an Office of Aeronautics and Space Technology program. NASA scientists have designed and built two major experimental facilities at the Lewis Research Center for conducting research on heating of fusion fuels and on means to use fusion energy in practical space systems. These facilities use powerful magnetic fields created by electromagnets made of superconducting materials to confine hot plasmas in this research on fusion energy for space. To date, a helium plasma with a temperature of 50,000,000 degrees has been produced and maintained for long periods of time.

For the next year or two, the research program will emphasize determination of plasma properties (temperature and densities). A necessary part of this work is research on instruments to provide the needed data under difficult conditions. Thereafter, the research will swing toward techniques to use plasma energies in space application.

Mariner 10 Scheduled for Third Mercury Encounter

Mariner 10 executed Trajectory Change Maneuver-7 on Feb. 13, which targeted it to fly by Mercury for the third time on March 16, 1975, at 6:39 p.m. EDT. The spacecraft will come within approximately 310 km of the surface, the closest of the three approaches. The primary emphasis will be to determine whether Mercury has an intrinsic or induced magnetic field.

On March 18 at 1:00 p.m. EDT, a press briefing will be held at the Jet Propulsion Laboratory on the preliminary science results. This briefing will be piped into the NASA Headquarters auditorium.

The spacecraft is still in a modified solar sailing mode with a slow roll period of once every eight or nine hours. At this time, sufficient gas and fuel remain to accomplish the third encounter if no unforeseen anomalies occur.

It was planned to turn on the TV cameras for the first time on March 12, and the other science instruments on March 13, except for the Infrared Radiometer Telescope, which will not be looking at the planet. Over 600 high resolution TV pictures of the far and near encounter will be obtained. The far encounter pictures will be received in real time at JPL. The near encounter pictures will be put on tape and played back at a later time.

Nasa Congratulates Soyuz 17 Crew

Upon the successful completion of the longest USSR space mission, Soviet officials and the Soyuz 17 crew were congratulated by Dr. James C. Fletcher, NASA Administrator, and his deputy, Dr. George M. Low. In their joint telegram to Academician M.V. Keldysh, USSR Academy of Sciences President, the NASA officials commented that "a flight of such duration promises to contribute significantly to understanding man's adaptation to space, and we look forward to learning the results of the physiological and other investigations." The healthy, two-man crew landed early on Feb. 9 in difficult weather conditions after spending 30 days in space performing numerous scientific and biomedical experiments.

Solar Photovoltaic Energy Briefings for Industry

Several hundred representatives of power-related industries recently were briefed at NASA's Jet Propulsion Laboratory and at NASA Headquarters on the nation's 10-year solar photovoltaic energy program. The Energy Research and Development Administration (ERDA), the National Science Foundation and NASA solar energy experts explained the 10-year program calling for providing technical feasibility by 1980 and culminating in full-scale power production by 1985. The Energy Administration's 1985 objective is the establishment of a large-scale energy plant which would add 500 million watts of power per year to the national total.

For the last decade, United States spacecraft have been efficiently powered by the conversion of the Sun's radiation to electricity through single-crystal silicon cells. However, many modifications and refinements will be needed to make solar cells and their crystal ribbon components commercially feasible. Major tasks include development of higher grade, lower-cost silicon; mass production of single-crystal silicon sheets; automated assembly of solar-cell arrays; and ultimately, a power production plant using the best solar cells developed.

The Federal Government, through ERDA, is sponsoring the solar energy development. NASA chose the Jet Propulsion Laboratory to manage the National Science Foundation low-cost solar array program.

Fletcher Says NASA Technology Aims at Solving Today's Problems

Tells AIAA Capability in Aerospace Field Must not Be Allowed to Deteriorate

"NASA's programs are now oriented directly toward today's needs and problems," Dr. James C. Fletcher, NASA Administrator, told members of the American Institute of Aeronautics and Astronautics at their recent annual meeting in Washington.

"We have turned from the beginning of space flight, where we were occupied with learning to operate in space," he added, "to a period where we are learning to use space for man's benefit directly."

Dr. Fletcher spoke on the topic of "Management of Aerospace Technology for National needs." He pointed out early in his talk that one of the distinctive features of U.S. success as a nation has been the development and application of technology. Much of this nation's wealth and power, he reminded, has derived directly or indirectly from its ability to bring science and the laboratory to useful application through technology development.

"Today the United States is preeminent in the world in nearly every area of high technology—and aerospace technology has been one of the key drivers," he said further. "This capability is a valuable national resource which must not be allowed to deteriorate—it must be carefully and thoughtfully cultivated. This, in my judgment, is a key management task.

"Recognizing that technology is a means to an end, we must define the national goals and objectives which have greatest value to this nation and to the world. An indispensable ingredient in achieving these goals and objectives is the application of technology; such application is an absolute essential to maintaining our preeminence in the world."

He admitted that this view is not universally shared, that some people claim that technology is the source of national problems rather than the hope for their solutions. Such argument is not without substance, he conceded, because clear cases exist where the thoughtless application of improper management of technology has caused environmental harm, with a resulting erosion of public support. But he added that the pendulum is beginning to swing back towards a reemphasis on technology, particularly among economists.

Effects of Technology Decline

"Decline of emphasis on technology, particularly in the private sector," he continued, "has much to do with the decline in rate of growth of productivity in this country, and the rapid growth of technology abroad, partially due to massive export of U.S. technology, was a major contributor to our unfavorable trade balance in recent years. Communicating these facts to the public and to national political leaders can and must be done."

He cited that another problem affecting U.S. ability to cultivate technology as a national resource and to gain public support is the increasing cost of technology developments brought about by inflation and the increasing complexity of technology applications. He said that finding ways to reduce costs is another key management task "that we in the aerospace business must face in order to gain maximum benefit from applying technology to national needs with limited resources."

Dr. Fletcher emphasized these four points:

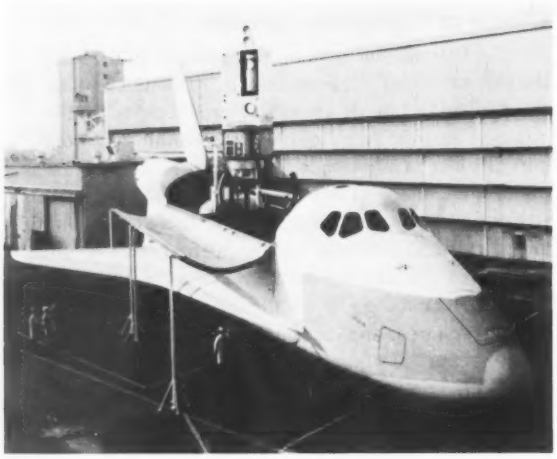
1. This nation's technological capability is an essential national resource which should be fully exploited to solve national problems.
2. This nation requires a well-thought-out, long-range set of national goals and objectives within the framework of which our technological capability can be made to flourish.
3. Those in the technical community must generate the strong public support required to sustain the large national programs that are needed to achieve these goals.
4. Technology managers must find and apply methods and techniques to apply technology directly to solving national problems and to make this new technology competitive and marketable by decreasing costs.

Other Excerpts from Remarks

Here are other excerpts from Dr. Fletcher's remarks:

"Since the early 1960s we have seen significant changes in our national perspectives. We've had growing inflation, coupled with an astonishingly rapid onset and growth of recession; energy shortages have been thrust upon the national consciousness in a way no previous forewarnings had succeeded in doing; and environmental concerns have grown with devastating economic impact in some sectors of the economy. Famine conditions in various parts of the world have illustrated a growing world food problem.

"NASA is facing this changing environment by responding to our current national needs in a number of ways. We are assuring that our current and planned programs are properly related to national needs. Our aeronautics program emphasizes noise reduction, pollution reduction, safety and energy conservation.



Money Saver of the Future—This full-scale, automated model of the Low Cost Modular Spacecraft (LCMS), the vehicle to orbit the Earth on a long-time basis without having to be brought back to Earth for repairs, was featured at a news conference held at Rockwell International at Downey, CA, recently.

The model was put through its paces in the cargo bay of the full-scale Space Shuttle Orbiter mockup.

The LCMS can be carried into orbit by rocket or the Space Shuttle. When necessary, it can be recovered by the Shuttle and held in position on a special platform that fits into the cargo bay of the Shuttle Orbiter. While in this position, a special mechanism is used to remove malfunctioning subsystems or experiments and replace them with new units brought from Earth.

Working in connection with the Shuttle when it begins operations in the early 1980s, officials believe savings by using the LCMS could run into hundreds of million of dollars over a period of 10 years in comparison with present methods of orbiting spacecraft that, once launched, cannot be recovered or repaired.

During this next fiscal year over 20 percent of our aeronautics budget will support programs that address aeronautical energy conservation.

"We estimate that, by 1985, the technology for fuel conservation can be developed to permit a 50 percent reduction in fuel consumption by new aircraft, which will be less noisy and will produce less pollution than current-generation aircraft. In the area of terrestrial energy, we expect to assist the new Energy Research and Development Administration where we have special expertise to contribute. In space, our applications program is contributing to solutions to the problems of energy shortages, environmental pollution and agriculture.

Must Have Massive Support

". . .Although we in the technical community see advanced technology as the key to relieving man's growing problems, there are many who disagree; and there are many more who are not even interested or concerned. Yet, to do the job that lies ahead requires massive support. Our job is to do all we can to garner that support at every political level from average citizen to President.

"We must, therefore, not only make the majority of people aware of the key issues and alternatives, but also induce them to act individually and in concert to express their concern. We need to play a stronger role in the decision-making process at the highest levels in both the executive and legislative branches. Our public relations must be more effective than in the past. We ought to get rid of our jargon—much of what we say to the public comes across like a foreign language. We must become articulate and understandable to the layman. We must never forget that in a democratic society the public is the ultimate source of our support. Congress listens to its constituents—an understanding and supportive electorate is essential."

Intelsat IV F-6 Launch Unsuccessful

An investigation is underway into the cause of the launch failure of COMSAT's Intelsat IV F-6 commercial communications satellite.

This was the first unsuccessful launch of an Atlas Centaur since 1971. Since that time, there have been 10 successful Atlas Centaur launches in a row.

The launch from Cape Kennedy, FL, on Feb. 20, 1975, at 6:35 p.m. EST appeared normal to booster engine cutoff of the Atlas, about two minutes into the flight. A number of abnormal events occurred simultaneously, including electrical problems and loss of altitude, and the vehicle tumbled in space. The Range Safety Officer sent a destruct command to the vehicle almost seven minutes into the flight when it was determined that the mission was lost. The vehicle impacted in the Atlantic Ocean about 500 miles downrange from the launch site.

Lewis Research Center in Cleveland, which manages the Atlas Centaur program, is in charge of the investigation. D. Schramo, Director of Space Flight Projects, was appointed chairman of the Failure Review Committee.

60th NACA Anniversary Will Occur Next Month

Nation Will Recall Agency that Planned Aeronautical Research in the United States

April will mark the founding 60 years ago of NASA's predecessor, the National Advisory Committee for Aeronautics. This relatively small, little-known Federal agency was for nearly half a century largely responsible for determining the extent and type of aeronautical research in the United States.

Committee members, appointed by the President under the provisions of an act of Congress, served without pay. They were from the university community, government agencies, military services, and an expanding aviation industry. They met periodically and, although they appointed a Director, retained for themselves the power to make policy decisions.

From 1915, when it was formed, to Oct. 1, 1958, when it was succeeded by the National Aeronautics and Space Administration, it maintained a profound impact on the standing of the United States as an air power during periods of "hot" or "cold" war, as well as on the early years of the space program.

Coincidentally, NACA's 60th anniversary comes less than four months after the death at Tucson, AZ, of the first person it employed—John F. Victory. He retired in 1960, after serving for 40 years successively as Assistant Secretary, Secretary, and Executive Secretary.

NACA was not an agency that came about easily. It was formed after years of doubt, uncertainty and struggle. At the time of its formation, the United States was the only major nation in the world without a government laboratory devoted to the science of flight.

Birth of Air Age

The Air Age arrived largely because of the efforts in the U.S. of two sets of aviation experimenters—Dr. Samuel P. Langley, Secretary of the Smithsonian Institution, who flew steam-powered, unmanned planes as early as 1896, and the Wright brothers, Wilbur and Orville, who on Dec. 17, 1903, at Kitty Hawk, NC, conducted the first powered flight of a heavier-than-air, man-carrying machine.

Four years passed, during which the world took note of what had happened but did little in the way of follow-up action. Then, in 1907, a group of men interested in aviaton formed the Aerial Experimental Association.

Involved were Dr. Alexander Graham Bell, inventor of the telephone; Alan H. Curtiss, an industrialist interested in aviation; J.A.D. McCurdy, a Canadian airplane designer and manufacturer; F.W. Baldwin, an engineer for the Bell laboratories in Canada; and Lt. Thomas E. Selfridge, a pioneer in military aviation. During the two years this organization existed, it constructed four airplanes, all of which were successfully flown.

By 1908, France, Germany, Italy and Russia each had begun national research efforts in aviation on a small scale. Great Britain had been at it since 1866. In the U.S., it was realized that, despite the practical demonstration of the airplane, any program to promote aviation would have to be sponsored by the Federal Government, because private funds were not available to support costly airplane construction.

During 1908, Wilbur Wright visited France, conducted flights near Le Mans, and aroused tremendous enthusiasm. While he was away, Orville began official tests of a machine the brothers were building under contract for the Army Signal Corps. On the 13th flight, the plane crashed, killing Lt. Selfridge and injuring Orville, who recuperated quickly enough to join Wilbur in Europe and to share in the honors accorded abroad.

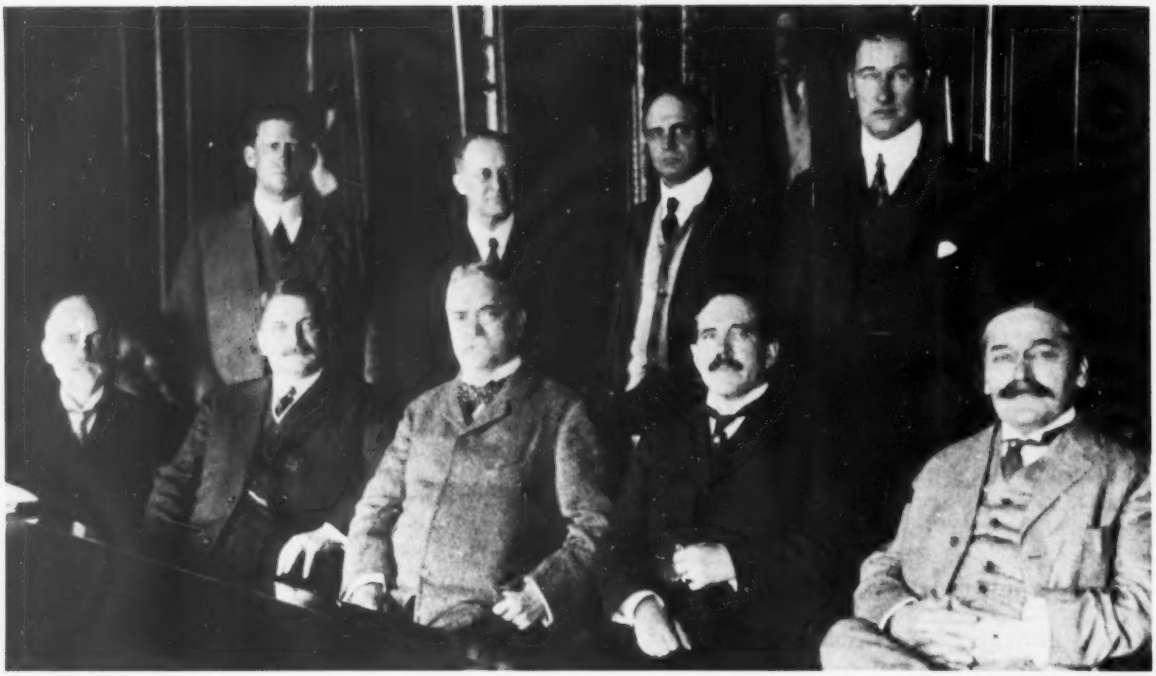
1909 Developments

In 1909, events moved along. Britain established an Advisory Committee on Aeronautics. Louis Bleriot, a French engineer and aviation pioneer, flew a 500-pound plane he had designed across the English Channel, a flight of 38 minutes at an average altitude of 250 feet and average speed of 45 m.p.h.

Back in America, Wilbur Wright staged demonstration flights up the Hudson River from Governor's Island, resulting in the formation of the American Wright Co., subsequently to deal for airplane construction with England, France, Germany and Italy, as well as the U.S. Meanwhile, a small group of American scientists and military men were busy trying to get the Federal Government to establish a national aeronautical laboratory. Besides Dr. Bell, its most active member was Dr. Charles D. Walcott, who had succeeded Langley as Secretary of the Smithsonian. He was a geologist rather than an aeronautical engineer, but was determined that the Smithsonian should regain its lead in aviation by having the laboratory become a part of the Institution.

During the next two years, while aeronautical development in Europe was rapid, no concrete action toward a national program occurred in America. The biggest step in this direction came on Dec. 19, 1912, when President Taft appointed a 19-man commission to make recommendations to Congress concerning the creation of a national aeronautical laboratory. It urged the establishment of such an agency in Washington and that it be administered by the Regents of the Smithsonian Institution. But the President had acted without the advice and consent of the Senate, so the commission's proposal was buried in the archives.

That year, Wilbur Wright died of typhoid fever in Dayton, OH. His brother was to outlive him by 36 years.

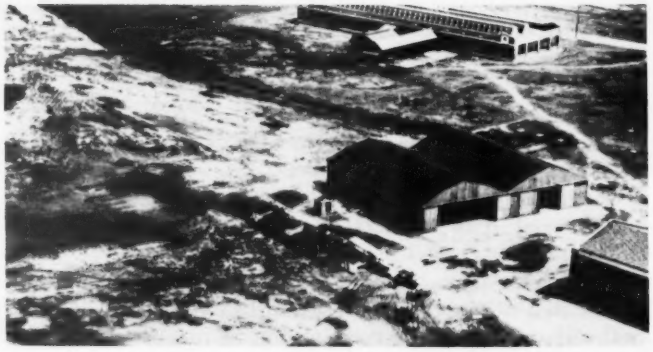


Initial NACA Meeting—These members of the National Advisory Committee for Aeronautics were photographed at the first meeting of the group, held on April 23, 1915, in the office of the Secretary of War.

Seated, left to right, are Dr. William F. Durand, Stanford University; Dr. S.W. Stratton, Director, National Bureau of Standards; Brig. Gen. George P. Scriven, Chief Signal Officer, War Department; Dr. Charles F. Marvin, Chief, U.S. Weather Bureau; and Dr. Michael I. Pupin, Columbia University. Standing, left to right, are Holden C. Richardson, Naval Constructor; Dr. John F. Hayford, Northwestern University; Capt. Mark L. Bristol, Director of Naval Aeronautics; and Lt. Col. Samuel Reber, U.S. Signal Corps.

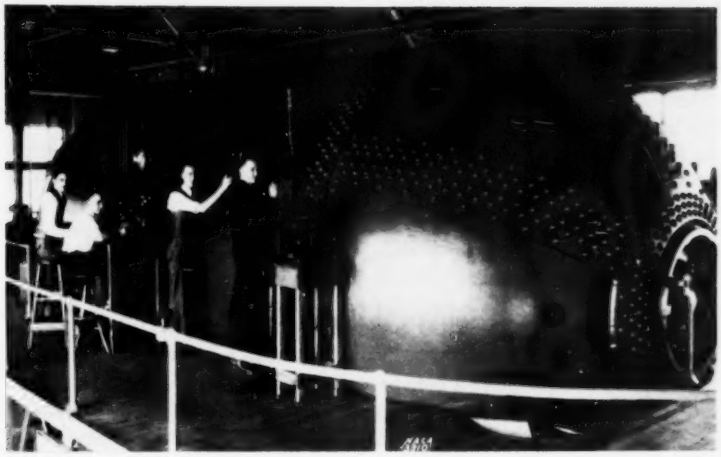
Members not in the picture include Dr. Joseph S. Ames, Johns Hopkins University; Dr. Charles D. Walcott, Secretary, Smithsonian Institution; and the Hon. Byron P. Newton, Assistant Secretary of the Treasury.

Langley's first wind tunnel began operation in 1920.



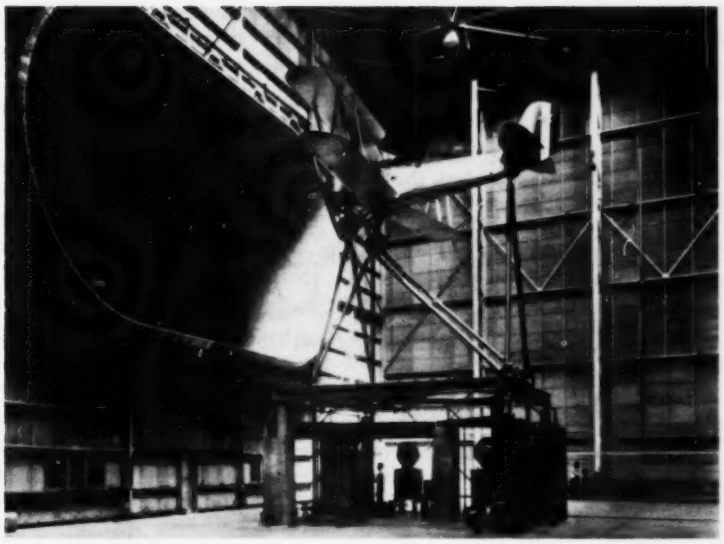
Langley Field in March, 1924. The five research aircraft are (from left) a Curtiss JN-4H ("Flying Jenny"); a Fokker D-VII, primary German fighter of World War I; a Thomas-Morse MB-3; a DeHavilland Dh-4; and a Sperry M-1.

A Ford Model T truck and a Huck starter prepare to rev up a Lewis & Vought VE-7 research plane.



Built in 1923, the variable-density wind tunnel was damaged by fire in 1927. This picture was taken when the tunnel reopened in 1929.

This Vought 03U-1 was the first complete airplane to be tested in the Full-Scale Wind Tunnel, which opened in 1931. The tunnel was closed for the first time in January, 1975, for a one-year rehabilitation.



Scientists Sent Abroad

Despite growing war rumors in Europe, the Smithsonian in 1913 sent Dr. Albert F. Zahm, in charge of Langley's old laboratory, and J.C. Hunsaker, Chairman of its National Advisory Committee for Aeronautics, to visit aeronautical research laboratories in England, France and Germany. The report submitted on their return clearly revealed the gap between aviation development in Europe and in America.

Outbreak of World War I in 1914 forced a rethinking of national attitudes toward aviation in the United States. It was reported that France had 1,400 airplanes, Germany 1,000, Russia 800, Great Britain 44, and the U.S. 23. The U.S. not only ranked below those nations, but also below Japan, China, Bulgaria, Greece and Brazil.

Many prominent Americans deplored the situation. They looked upon it as not only a national disgrace, but also as a possible danger to U.S. security. President Woodrow Wilson, however, was pursuing a policy of strict neutrality, hoping to keep the nation out of the war in Europe. There the matter rested. The only break came when Congress authorized the establishment of an aviation section of the U.S. Signal Corps, action taken to strengthen America's air power. This added military implications and paved the way partly for what was to follow soon after the New Year.

Memorandum Prepared

A special Smithsonian committee prepared a memorandum vigorously advocating the establishment by Congress of an advisory committee for aeronautics and forwarded it to the President and to the Speaker of the House. The Navy heartily endorsed the idea in a letter dated Feb. 12, 1915, and signed by Franklin D. Roosevelt as Acting Secretary.

A joint resolution providing for this action was drawn up and attached as a rider to the Naval Appropriation Bill. It was approved March 3, the day before Congress adjourned, and was sent to the White House for signature. The President was empowered by it to appoint a 12-member committee. An annual appropriation of $5,000 for a period of five years was stipulated.

As the resolution provided, the President made these appointments:

Two from the War Department—Brig. Gen. George P. Scriven, Chief Signal Officer, an Lt. Col. Samuel Reber, Signal Corps.

Two from the Navy Department—Capt. Mark L. Bristol, Director of Naval Aeronautics; and Holden C. Richardson, Naval Constructor.

One from the Smithsonian—Dr. Charles D. Walcott, Secretary.

One from the U.S. Weather Bureau—Dr. Charles Marvin, Chief.

One from the U.S. Bureau of Standards—Dr. Samuel W. Stratton, Director.

Five members acquainted with the needs of aeronautical science or skilled in aeronautical engineering—Dr. Joseph S. Ames, Johns Hopkins University; Dr. William F. Durand, Stanford University; Dr. John F. Hayford, Northwestern University; Dr. Michael I. Pupin, Columbia University; and the Hon. Byron F. Newton, Assistant Secretary of the Treasury.

First NACA Meeting

The first meeting of the committee was held in the office of the Secretary of War on April 23, 1915. In the call that went out to members, the word "National" was prefixed to the title "Advisory Committee for Aeronautics."

A year later, the committee recommended that land about four miles north of Hampton, VA, be purchased. Named Langley Field, this site became the home of NACA's first research center.

For the fiscal year 1917, NACA asked for and received $85,000, almost all of which went toward construction of a new laboratory at Langley Field. The war was over before this facility could be said to be in useful operation. The annual report for 1919 noted that the first wind tunnel had been completed, but was inoperative for lack of power.

That year, there was some talk of moving NACA's field station activities to Bolling Field at Washington, but the necessary Congressional approval did not come and, in April, 1920, Langley Field was accepted as the permanent site. Dedication exercises were held there on June 11, a date recognized as the official beginning of NACA's own program of aeronautical research, conducted by its own staff in its own facilities.

Over the years, NACA's work continued, but its facilities never became extensive. In 1939, as new war clouds gathered, Congress authorized a second laboratory, and in early 1941 the Ames Aeronautical Laboratory (now Ames Research Center) began operations at Moffett Field in California. In 1942, a flight propulsion laboratory, called the Lewis Flight Propulsion Laboratory (now Lewis Research Center), was opened adjacent to Cleveland's Municipal Airport. Both were staffed by Langley personnel.

The two new laboratories, together with the demands of World War II, meant rapid growth for NACA between 1940 and 1945. NACA's contribution to the air successes of the Allies was substantial.

A Navy Estimate

Discussing the effect of NACA's activities on naval warfare, the late Frank Knox made the following statement while he was Secretary of the Navy:

"New ideas are weapons of immense significance. The United States Navy was the first to develop aircraft capable of vertical dive bombing; this was made possible

by the prosecution of a program of scientific research by the NACA. The Navy's famous fighters—the Corsair, Wildcat, and Hellcat—are possible only because they were based on fundamentals developed by the NACA. All of them use NACA wing sections, NACA cooling methods, NACA highlift devices. The great sea victories that have broken Japan's expanding grip in the Pacific would not have been possible without the contributions of the NACA."

After the war, NACA was free once again to move ahead in the frontiers of aeronautical research. Post-war work focused on more speed, higher altitudes, and new and better power plants, including both jet and rocket engines. To aid research work in these areas, a Pilotless Aircraft Research Station for launching rockets (now Wallops Flight Center) was established in 1945 at Wallops Island, VA, as an adjunct to Langley Laboratory. Two years later came the establishment of a somewhat more autonomous High Speed Flight Station (now Flight Research Center) at Edwards Air Force Base in California.

At the start of World War II, NACA's facilities were valued at only a few million dollars and were maintained by fewer than 400 employees. When the agency was replaced in 1958 by NASA, the value had risen to $300,000,000 and its staff to 8,000. It was then President Eisenhower said by way of a benediction:

"The enactment of the law establishing the NACA in 1915 proved a decisive step in the advancement of our civil and military aviation."

Space Transportation Award Is Presented to Dr. Petrone

Dr. Rosco Petrone

Dr. Rocco A. Petrone, Associate Administrator of NASA, was presented the Louis W. Hill Space Transportation Award at the 11th annual meeting of the American Institute of Aeronautics and Astronautics in Washington, DC, Feb. 26.

It was one of 12 major AIAA annual Awards bestowed at that time. Dr. Petrone's citation specified: "For distinguished contributions to space flight technology through his engineering excellence in launch operations, and outstanding managerial skills in directing the last six highly successful Apollo missions for the scientific exploration of the Moon and Lunar environment."

The award, named in memory of Transportation Pioneer Hill, is administered by AIAA on behalf of the Louis W. Hill and Maud Hill Family Foundation. It includes a certificate of appreciation and an honorarium of $5,000.

Those connected with space who have won it in the past include Robert H. Goddard, James A. Van Allen, Robert R. Gilruth, C. Stark Draper, Hugh L. Dryden, Wernher von Braun, W. Randolph Lovelace, II, Abe Silverstein, W.H. Pickering, George M. Low, Christopher C. Kraft, Jr., Hubertus Strughold and Kurt H. Debus.

Dr. Petrone, a West Point graduate who served in Germany from 1947 to 1950, took his graduate degree in mechanical engineering at the Massachusetts Institute of Technology. After working on the Army's Redstone missile at Redstone Arsenal, Huntsville, AL, he was named Director of Launch Operations at the Kennedy Space Center. Later, he was appointed Director of the Apollo Program and transferred to Headquarters.

In January, 1973, he was made Director of the Marshall Space Flight Center, serving in that capacity until he was called back to Headquarters as Associate Administrator in March, 1974.

On Jan. 28 of last year, he was honored at the annual AIAA Fellows Dinner in Washington by being formally inducted into the select community of Fellows.

Nobel Laureate Lectures at MSFC

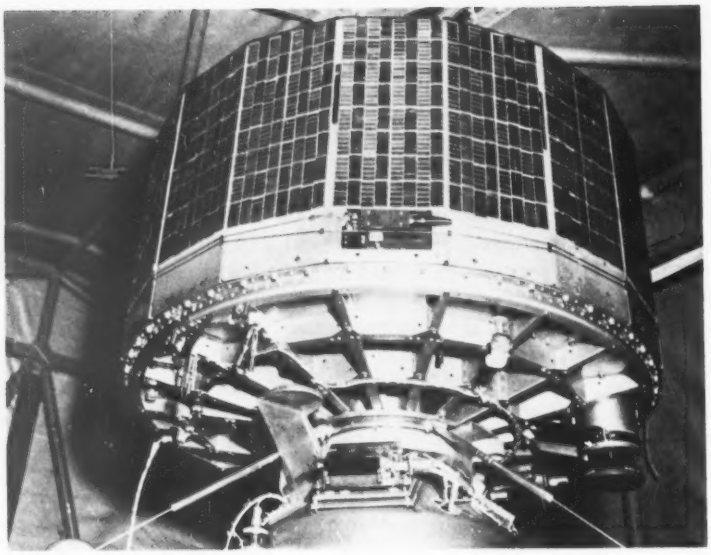
Dr. Hannes Alfven, professor at the Royal Institute of Technology, Sweden, who received the Nobel Prize in physics for 1970 for his work in the physics of plasma and hot electrified gasses, lectured on the subject "Space Research and the Evolution of the Solar System" at the Marshall Space Flight Center recently.

Ceremonies marking the issuance of a 10-cent Pioneer-Jupiter postage stamp commemorating America's first flights to the planet Jupiter were held at Ames Research Center Feb. 28.

The U.S. Postal Service has printed 140 million of the colorful stamps and opened a temporary branch post office at ARC.

Water vapor has been detected for the first time deep in the atmosphere of Jupiter.

The discovery was made from NASA's new C-141 Airborne Infrared Observatory, a large four-jet cargo aircraft fitted with a 91.5 centimeter (36-inch) infrared telescope and based at Ames Research Center. It can fly at high altitudes, above virtually all the water vapor in the Earth's atmosphere which ordinarily masks infrared observations.



15th TIROS Anniversary Approaching— *This hatbox-shaped spacecraft carrying television cameras was launched on April 1, 1960. It was the first true weather satellite, TIROS-1, and viewed the Earth's cloud cover from about 725 km (450 miles). The newest weather satellites in the sky are the first two in the Synchronous Meteorological Satellite (SMS) series, which give a continuous weather picture of the Western Hemisphere from 36,350 km (22,590 miles), making possible the spotting of hurricanes and other major storms.*

Awards Indicate World's Appreciation of Skylab

Crew Members Already Have Been Showered With Acclaim More Than 100 Times

If the number of awards and fellowships bestowed upon the members of its three crews is an indication, Skylab is easily the most popular, worldwide, of any space undertaking to date.

Well over a hundred awards, including recognition for earlier missions, have been presented the nine crewmen—first manned mission, Charles Conrad, Jr., Joseph P. Kerwin and Paul J. Weitz; second, Alan L. Bean, Owen K. Garriott and Jack R. Lousma; third, Gerald P. Carr, Edward G. Gibson and William R. Pogue.

Others are still in the works. As late as December, announcement was made that the Harmon Astronaut's Trophy for 1974 was to be awarded jointly to Conrad, Kerwin and Weitz. The presentation customarily is made at the White House by either the President or Vice President, but no date for the ceremony so far has been set.

This award, founded in 1926 by the late Col. Clifford B. Harmon, pioneer American balloonist and aviator, is for outstanding feats of individual piloting skill adjudged "worthy of international recognition and contributing to the art and science of flight."

Last March, at the annual Goddard Memorial Dinner, William C. Schneider, Director of the Skylab Program, was presented the Astronautics Engineer Award of the National Space Club "for his exceptional personal leadership of the Skylab Space Station Program."

During the same month, the American Astronautical Society bestowed its Achievement Award upon John H. Disher "in recognition of his continued outstanding management demonstrated as Deputy Director of the Skylab Program, which has been designated as one of the greatest space accomplishments of the United States."

On May 9, the Skylab team was especially honored by the National Space Club at a reception on Capitol Hill given "in recognition of one of the greatest team efforts ever assembled, by applying the best technical effort to assure attainment of the technical objectives, and by mounting a heroic effort to save each of the three missions." Designated "A Salute to Skylab," the ceremony was highlighted by the presentation of a commemorative plaque.

Collier Trophy Presented

One of the highest honors was accorded last June when Director Schneider and members of the three Skylab crews were presented the Robert J. Collier Trophy by the National Aeronautic Association. The award, established in 1912, is given annually "for the greatest achievement in aeronautics or astronautics in America, with respect to improving the performance, efficiency or safety of air or space vehicles, the value of which has been thoroughly demonstrated by actual use during the preceding year."

Last fall, in a gesture of worldwide scope, the Federation Aeronautique International (FAI), meeting at Sydney, Australia, presented its Gold Space Medal for 1973, one of its two highest awards, to Charles Conrad, commander of the first Skylab crew; and its second highest space award, the Yuri Gagarin Gold Medal for

1973, to Alan Bean, commander of the second crew.

In addition, FAI awarded its V.M. Komarov Diploma for 1973, given annually to astronauts or cosmonauts who are members of multi-seated crews for outstanding achievements in the exploration of outer space during the previous year, to the crews of both the first and second manned Skylab missions and to the crew of Soyuz 13.

A further recognition from this organization brought the Skylab Emergency Support Team the FAI Honorary Group Diploma for Astronautics, a limited number of which are presented each year to scientific bodies, governmental agencies, and aerospace corporations which have greatly contributed to aeronautics and astronautics during the previous year. The Support Team's citation specified that the award was "in recognition of the outstanding accomplishments in the design, development, fabrication, test, and evaluation of thermal shielding devices to protect the Skylab orbital workshop from overheating and permit flight crew habitation, and for the accomplishment in the development of extravehicular activity procedures that enabled the installation of these devices in space critical to the success of the first Skylab missions."

In commenting on the awards, Director Schneider pointed out that, while they were presented directly to the astronauts and others, including himself, he would like for members of the Skylab team to look upon them as symbolic awards for a job well done and representative of the honors each of them deserves to receive.

List of Awards

Following is a list of the awards received or to be received by the Skylab crew members:

Charles Conrad, Jr.—two NASA Distinguished Service Medals, two NASA Exceptional Service Medals, Navy Astronaut Wings, two Navy Distinguished Service Medals, two Distinguished Flying Crosses, two American Astronautical Society Flight Achievement Awards, Princeton's Distinguished Alumnus Award, U.S. Jaycees' 10 Outstanding Young Men Award, American Astronautical Society Flight Achievement Award, Pennsylvania's Award for Excellence in Science and Technology in 1967 and 1969, Rear Adm. William S. Parsons Award for Scientific and Technical Progress, AIAA Haley Astronautics Award, Godfrey L. Cabot Award, Silver Medal of the Union League of Philadelphia, FAI Yuri Gagarin Gold Space Medal and De La Vaulz Medal, City of Chicago Gold Medal, National Academy of Television Arts and Sciences Special Trustees Award, Federal Aviation Administration's Space Mechanic Technician Award, Robert J. Collier Trophy, Los Angeles Chamber of Commerce Kitty Hawk Award, FAI V.M. Komarov Diploma for 1973, FAI Gold Space Medal for 1973, and Harmon Astronaut's Trophy for 1973.

Joseph P. Kerwin—NASA Distinguished Service Medal, Johnson Space Center Commendation Medal, Navy Distinguished Service Medal and Astronaut Wings, Federal Aviation Administration's Space Mechanic Technician Award, Stritch Medal from Loyola University's Stritch School of Medicine, Los Angeles Chamber of Commerce Kitty Hawk Award, City of Chicago Gold Medal, University of Notre Dame College of Engineering Honor Award, Grant Hospital's Founders Award (Chicago), Aerospace Medical Association's Hubertus Strughold Award, Robert J. Collier Trophy, AAS Flight Achievement Award, AAS Melbourne W. Boynton Award, AIAA Haley Astronautics Award, FAI's V.M. Komarov Diploma for 1973, Harmon Astronaut's Trophy for 1973.

Paul J. Weitz—NASA Distinguished Service Medal, Navy Distinguished Service Medal, Navy Astronaut Wings, Navy Air Medal, Navy Commendation Medal, Federal Aviation Administration's Space Mechanic Technician Award, Los Angeles Chamber of Commerce-Kitty Hawk Award, City of Chicago Gold Medal, Robert J. Collier Trophy, Pennsylvania State University Alumni Association's Distinguished Alumni Award, AAS Flight Achievement Award, AIAA Haley Astronautics Award, FAI's V.M. Komarov Diploma for 1973, Harmon Astronaut's Trophy for 1973.

Owen K. Garriott—National Science Foundation Fellowship at Cambridge University, National Science Foundation Fellowship at the Radio Research Station at Slough, England, NASA Distinguished Service Medal, City of Chicago Gold Medal, Robert J. Collier Trophy, FAI's V.M. Komarov Diploma for 1973.

Jack R. Lousma—Johnson Space Center's Certificate of Commendation, NASA Distinguished Service Medal, Navy Distinguished Service Medal, Navy Astronaut Wings, City of Chicago Gold Medal, Robert J. Collier Trophy, Marine Crops Aviation Association's Exceptional Achievement Award, FAI's V.M. Komarov Diploma for 1973.

Gerald P. Carr—National Defense Service Medal, Armed Forces Expeditionary Medal, Marine Corps Expeditionary Medal, Letter of Commendation from the Commander of Carrier Division III, NASA Group Achievement Award, NASA Distinguished Service Medal, Navy Distinguished Service Medal, Navy Astronaut Wings, City of Chicago Gold Medal, University of Southern California Alumni Merit Award, Boy Scouts of America Distinguished Eagle Scout Award, Robert J. Collier Trophy, City of New York Gold Medal, Marine Corps Aviation Association's Exceptional Achievement Award.

Edward G. Gibson—National Science Foundation Fellowship and R.C. Baker Fellowship at the California Institute of Technology, Johnson Space Center Certificate of Commendation, NASA Distinguished

Service Medal, City of New York Gold Medal, Robert J. Collier Trophy.

William R. Pogue—NASA Distinguished Service Medal, Johnson Space Center Superior Achievement Award, Air Medal, Air Force Commendation Medal, National Defense Service Medal, Outstanding Unit Citation, Air Force Distinguished Service Medal, Air Force Command Pilot Astronaut Wings, City of Chicago Gold Medal, Robert J. Collier Trophy, City of New York Gold Medal.

LaRC Physicist Shares Award for Medical Monitoring Device

Dr. Joseph S. Heyman, a physicist in the Instrument Research Division at Langley Research Center, recently shared an "I-R 100" award for his work in developing a medical monitoring device.

"I-R 100" awards are presented each year to the 100 most significant new technical product developments selected in a competition sponsored by Industrial Research Magazine.

Dr. Heyman worked with a five-man research team from Washington University at St. Louis in developing the monitor. Led by Professor James G. Miller, the team's activity is confined to the University's Laboratory for Ultrasonics.

Called a continuous wave ultrasonic microemboli monitor, the device monitors impurities in a patient's blood during open-heart surgery. New features of the monitor are its compact size, ease of operation and relatively low cost.

The instrument is a simple and reliable method of detecting gaseous and solid impurities (called microemboli) in blood, which is circulated and oxygenated by a heart-lung bypass machine during open-heart surgery.

Further testing and development are necessary before the monitor's full potential can be realized, but it has already been used to investigate the efficacy of blood filtration devices and the influences of heparin, a commonly used anticoagulant.

Potential medical uses are in artificial kidneys, blood banks, and during blood transfusions. Investigations at Langley involve a wide range of possible non-medical applications using contaminants in fluid flow systems.

UCLA extension is offering, during the week of April 14–18, a short course covering the latest analysis of methods and engineering practices used to design aircraft structures for long trouble-free service.

Flemming Award—Dr. Carolyn Huntoon of the Johnson Space Center receiving the Flemming Award from Dr. Arthur S. Flemming, for whom it is named. The award is given annually by the Downtown Jaycees of Washington, DC.

Dr. Huntoon Is Presented Arthur S. Flemming Award

For the second time in the last six months, Dr. Carolyn L. Huntoon, head of the Endocrine Laboratory at Johnson Space Center, has received a prestigious honor.

On Feb. 27, at a luncheon at the Mayflower Hotel in Washington, DC, she was presented the Arthur S. Flemming Award, given annually to outstanding individuals in the Federal Government in recognition of meritorious work and to encourage high standards of performance in the Federal service.

Last October, at ceremonies held at the State Department in Washington, she received the National Civil Service League's Career Service Award for Special Achievement. This is presented each year to spotlight high quality of public servants and to encourage quality job performance.

As head of the Endocrine Laboratory at JSC, it was pointed out in connection with her selection to receive the Flemming Award, Dr. Huntoon has been the spearhead for research into the biochemical effects upon man of sustained flight in the weightless environment of space. She not only directed biochemical research activities in the Apollo Program, but coordinated the work of scientists located throughout the United States in examination of endocrinological and biochemical data resulting from this nation's entire history of manned space flight. She was personally responsible for an important biomedical experiment conducted onboard all three Skylab flights and for biomedical research activities associated with the Apollo Soyuz Test Project.

Others connected with the space program who have received the Flemming Award include Maxime A. Faget, Joseph W. Siry, Edgar M. Cortright, Jr., George M. Low, Christopher C. Kraft, Jr., Leonard Jaffe, Robert Jastrow, George F. Pezdirt, Neil A. Armstrong, Lynwood C. Dunseith, Harrison H. Schmitt and Glynn S. Lunney.

Models Before Congress—At left, Dr. George M. Low (left), Deputy Aministrator, explains to Congressman Larry Winn, Jr., (R-KA) a model of one of the dedicated cargo aircraft concepts discussed during recent NASA benefits presentations before the House Authorization Committee on Science and Technology. Under the concept, payload and fuel would be distributed in the wings of the plane, offering potentially greater structural efficiency and increase in payload fraction over conventional fuselage-loaded planes. At right is a model of the 100 KW windmill under construction at the Lewis Research Center for the Energy Research and Development Administration.

Announcement

The Administrator of NASA and Mr. Joseph M. Hogan, formerly Director of the Contractor Equal Opportunity Program for NASA, have settled the discrimination complaint and law suit brought by Mr. Hogan. As a part of the settlement, it was agreed that the following information concerning the dispute would be provided to all NASA employees.

Mr. Hogan has accepted a position with the Defense Supply Agency as Chief, Field Operations Division, Office of Contracts Compliance. In this position, Mr. Hogan will provide leadership to Department of Defense field offices responsible for assuring that Government contractors comply with the national policy of equal employment opportunity.

Mr. Hogan entered service at NASA in 1969 to develop and lead NASA's program for contractor compliance. He designed, organized and managed the program from March, 1970, to October, 1973. During the period of his leadership, minority employment by NASA contractors was increased from 9.3 percent to 14.5 percent, despite a decrease in total jobs of 7.9 percent. Increases were especially significant in the Managerial, Professional, Office and Clerical categories. The employment of women increased from 15.7 percent to 17.5 percent, notwithstanding the decline in total employment.

In the fall of 1973, a dispute arose in the Office of Equal Opportunity Programs. In a report submitted to the Administrator on Sept. 21, 1973, Mr. Hogan sought several changes which he considered essential to the success of NASA's EEO program, including among other things the reassignment of the head of the Office of Equal Opportunity Programs. Management did not accept the recommendations on the terms proposed. The Administrator, noting the apparent disunity within the Office of Equal Opportunity, decided to reassign Mr. Hogan, effective Oct. 15, 1973, to become Industrial Compensation Officer in the Office of Industrial Relations. Mr. Hogan in his discrimination complaint sought reinstatement on the ground that this transfer was in retaliation for his advocacy of the program changes; however, the Administrator denied this charge without qualification.

While Mr. Hogan's complaint and subsequent lawsuit were being processed, Mr. Hogan, in his new position, pioneered the development of procedures to establish contractor work force compensation profiles. These profiles, which were suitable for application in computers, will provide more accurate comparability with work force compensation patterns of private firms in localities around NASA installations. The increased accuracy is important to NASA, because compensation of the NASA support service work force depends in part on prevailing patterns of compensation in the local area.

Subsequently, in July, 1974, the Office of Federal Contract Compliance directed the transfer of responsibility for contract compliance review over NASA contractors to the Defense Supply Agency and the General Services Administration. Before the effective date of that transfer, NASA offered to settle Mr. Hogan's complaint in accordance with his wish to perform contract compliance duties by reinstating him in his former position for the purpose of enabling him to transfer with it to one of the receiving agencies. Before the transfer arrangements could be completed, however, the Defense Supply Agency selected Mr. Hogan for a merit appointment.

Settlement of Mr. Hogan's complaint and lawsuit has now been accomplished.

Dr. Mark Named AIAA Fellow

Dr. Hans Mark

Dr. Hans Mark, Director of Ames Research Center, was named a Fellow of the American Institute of Aeronautics and Astronautics at its recent annual meeting in Washington, DC.

Dr. Mark was cited for his outstanding contributions and acknowledged leadership in the professional aerospace community by Institute President Daniel J. Fink. The rank of Fellow is bestowed only on persons "of distinction who have made notable and valuable contributions to the arts, sciences or technology of aeronautics or astronautics."

As recipient of the designation, Dr. Mark joins a list of 18 others honored by the AIAA, a leading professional society of the aerospace community. Author of more than 70 research papers, he has continued research activities in his original field, atomic physics, since joining Ames in 1969. He held teaching positions at the Massachusetts Institute of Technology and the University of California at Berkeley and is currently an associate advisor to the U.S. Air Force Scientific Board.

At ARC, Dr. Mark directs research in aerodynamics, computation and simulation science, for spaceflight projects like the Pioneer-Jupiter Mission, life sciences, and astronautics.

He was born in Mannhein, Germany, in 1929, came to the United States in 1940, and became a citizen in 1945.

NASA's Orbiting Solar Observatory-5, originally intended to operate only a year or two, has begun its seventh year in orbit around the Earth. Launched on Jan. 22, 1969, to observe the Sun, it has completed more than 34,000 orbits 500 kilometers above the Earth.

Spacesuit Meeting— Col. Aleksey Leonov, who will be the Soyuz crew commander of the ASTP joint mission next July, greets Robert E. Smylie prior to a briefing on the spacesuit in the background that the latter recently was honored for developing.

Robert Smylie Honored for Work on Apollo Life Support System

Robert E. Smylie, Deputy Associate Administrator for Space Technology in the Office of Aeronautics and Space Technology, recently was elected an Honorary Member of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE), in recognition of his work in the design, development, and test of the spacesuit and other portable life support equipment.

Smylie also was instrumental in converting the lunar pack design from a gas to a liquid cooling system, providing greater lunar exploration capability for astronauts.

The membership to which Smylie was elected is the Society's highest honor. Only 14 others, including Herbert Hoover, Milton Eisenhower and Theodore von Karman, have been named to it.

Prior to assuming his position at NASA Headquarters in November, 1973, Smylie, a graduate of Mississippi State University, was Chief of the Crew Systems Division at Johnson Space Center. Earlier, he had held the positions of Assistant Chief for Apollo Support, Crew Systems Division; Chief, Apollo Support Office; and Head, Environmental Control Systems Branch, Life Systems Division.

For his work, Smylie has received a number of other awards, including NASA's Exceptional Service Medal.

Cortright to Head AIAA in 1976

Dr. Edgar M. Cortright, Director of Langley Research Center, has been elected the 1976 President and Chairman of the Board of Directors of the American Institute of Aeronautics and Astronautics.

AIAA was formed in 1963 by the consolidation of the American Rocket Society, founded in 1930, and the Institute of Aerospace Sciences, founded in 1932. Its 27-man Board of Directors is composed of leaders of the aerospace community from government, private industry, and the education community.

With a membership of more than 22,000, AIAA is the principal technical society of the world offering professional society affiliation to scientists and engineers concerned with the aeronautical and astronautical disciplines.

Long-Distance Lectures Held for Students and Public

A trans-Atlantic and trans-Deep South tele-lecture was held recently during a NASA educational program at the University of North Carolina's Morehead planetarium in Chapel Hill, NC.

Those who participated in the long-distance lectures for both students and the general public included Dr. Gerald Soffen, Chief Scientist for the Viking Project, Langley Research Center; Dr. Carl Sagan, Cornell University, a member of the Viking Lander Imaging Team; and Astronaut Dr. Joseph Kerwin.

Dr. Soffen was at Chapel Hill to talk about Viking during a "community impact" program arranged by Langley's Office of Public Affairs and Educational Programs. Meanwhile, Dr. Sagan was at a meeting of the Royal Society in London, and Dr. Kerwin was at the Johnson Space Center.

Dr. Sagan went to the NASCOM switching center at 2 a.m. (London time) to talk with Dr. Soffen and the Morehead Planetarium audience. This tele-conference ended about 10:15 p.m. (Chapel Hill time), after which a second telecon began between Dr. Soffen, the audience and Dr. Kerwin, beginning at 9:15 (Houston time) and, with a question-and-answer session, lasting 30 minutes.

Radio-Television

(Released Nationally)
March
TELEVISION—A color film release in the *Aeronautics and Space Report* series, "Calypso Assists NASA," (w/Jacques Cousteau).
RADIO—Four weekly *Space Story* programs have been released: "Shuttle Checkout and Launch," (KSC/Williams); "Mariner-Mercury 3," (JPL/Dunne); "Isolation Garment," (JSC/Spross); and "ASTP Mission," (JSC/Frank). One monthly *NASA Special Report*, "Medical Benefits from Space," (Ranchos Los Amigos Hospital).

Bernard Moritz

Boyd C. Myers, II

Top Organization, Management Officials Announce Retirement

The NASA Headquarters Office of Organization and Management is losing its two top officials.

Bernard Moritz, Associate Administrator for Organization and Management, and Boyd C. Myers, II, Assistant Associate Administrator, recently announced their retirement.

Moritz retired from Federal service on Dec. 31, 1974, but continued to work until the end of February as a reemployed annuitant in order to complete certain actions of vital interest to NASA, while Myers will serve in a similar capacity possibly until April.

Moritz joined NASA in 1958. Before becoming Associate Administrator on March 15, 1974, he served as Assistant General Counsel for Procurement, Deputy Assistant Administrator for Industry Affairs, and Assistant Administrator for Special Contracts Negotiation and Review. He will continue to assist NASA as a consultant on management and on legal and procurement matters.

Myers began work in 1947 as an aeronautical research scientist for NASA's predecessor, the National Advisory Committee for Aeronautics, at Langley Research Center. In 1950, he was transferred to Washington, DC, and served successively in the Office of Advanced Research and Technology as Assistant to the Director, Director of Program Review and Resources Management, and Deputy Associate Administrator for Operations.

He is a former chairman of the Washington Section of the American Institute of Aeronautics and Astronautics, and has authored a number of technical papers. NASA presented him with its Outstanding Leadership Medal.

Transparent Furnace System

The Marshall Space Flight Center has issued to the aerospace industry a request for quotations on a transparent furnace system for materials processing in space.

A 16-month contract will be awarded for the design, fabrication, test and delivery of one non-flight engineering model and two flight versions of the transparent furnace system for possible use on Black Brant VC sounding rockets.

Astronaut Aldrin's Late Father Was One of Goddard's Students

Dr. Robert H. Goddard

"I am going to read a paper before the National Academy in Washington on the use of the rocket method in weather forecasting* * *."

So wrote a teacher to one of his former students.

The teacher: Dr. Robert H. Goddard, "Father of Rocketry"; the student, Edwin E. Aldrin, Sr., father of Edwin E. Aldrin, Jr., the second astronaut to put foot on the Moon.

The correspondence was recalled following the recent death of the senior Aldrin, a retired U.S. Air Force colonel. He had studied under Dr. Goddard from 1914 to 1915 at Clark University in Worcester, MA, where they both were born and reared.

Goddard's letter about reading the paper was dated April 30, 1930, and was one of several between the two still extant. The teacher revealed that he was coming to Washington at the suggestion of "the Smithsonian people" and added:

Col. E. E. Aldrin, Sr.

"If it is not too much bother, I would be 'tickled to pieces' if you could have any dope available sent me (to be held at Hotel Continental) on any advantages of a means of getting data daily, at some particular height, at a number of separate stations."

If this were done, he pointed out, it would be possible to make daily weather maps to represent conditions aloft.

"It seems to me," he continued, "that wind direction and velocity might be important, if nothing more.

"I have succeeded in interesting some of the Washington people in the general project, and if this feature has much value for aviation, and whoever says so would let me refer to him as an authority, it might help to move things faster."

A letter from Goddard to Aldrin dated Dec. 19, 1921, referred to gun recoil and to a bomb proposition, the latter of which the famous physicist advised should be developed on a moderate scale first. It involved propelling a bomb while in a vertical tube,"as otherwise some of the flare-back, after the projectile left, would come back and hit the plane."

On Sept. 29, 1928, the student, while Aviation Manager of the Standard Oil Development Co. in New York, wrote his former teacher:

"Our Research Department is very much interested in my description of your experimental work in connection with rockets. They wish me either to interview you in the next week or two or to have you come down here at their expense.

"I am writing you to find out if you are still at Worcester and if you could conveniently see me, especially over a weekend."

Col. Aldrin, who died on Dec. 28 while visiting a daughter in San Francisco, served as a consultant to the Director of NASA's National Safety Office.

Materials Processing Experiments in Near Weightlessness Are Planned

Materials processing experiments in near-weightlessness will be performed for the first time aboard unmanned sounding rockets in a new project to be managed by the Marshall Space Flight Center for NASA's Office of Applications.

Three flights per year are planned from 1975 through 1980. Initially, the project will use small Black Brant VC sounding rockets, fired from the Army's White Sands Missile Range in New Mexico and providing up to six minutes of low gravity (one $^{10}/_{1000}$th of Earth's gravity) during the coast phase of the sub-orbital ballistic trajectory.

A larger rocket, the surplus Minuteman I second stage, called "Aries", is being studied for possible use beginning in 1976 or 1977. The Aires would have a 44-inch payload diameter, compared to 17 inches for Black Brant, would have three to four times as much weight-carrying capability, and could provide up to 10 minutes of low gravity.

Wallops Flight Center in Virginia is also being considered as a future launch site.

All scientific payloads will be recovered for ground analysis. The Goddard Space Flight Center will provide launch and payload recovery services.

The new project is a low-cost effort using sounding rockets already in NASA's inventory. Its goal is to expand upon the observations made during the Skylab missions where metals were melted and allowed to solidify with little convection and sedimentation.

MSFC Assigned AMPS Payload Study

NASA's Office of Space Science has assigned the Marshall Space Flight Center overall responsibility for a definition study of the Atmospheric, Magnetospheric and Plasmas-in-Space (AMPS) Spacelab payload.

The payload unit will be a spaceborne, Earth-orbiting scientific laboratory, manned by scientists and equipped to study the environment in which it flies. It is one of several Spacelab payloads planned for flight on the Space Shuttle in the 1980s and 1990s.

Through use of the laboratory, scientists will obtain a better understanding of the dynamic processes of the atmosphere and magnetosphere which influence everyday problems such as communications blackouts, atmospheric pollution and, possibly, even solar-weather relationships.

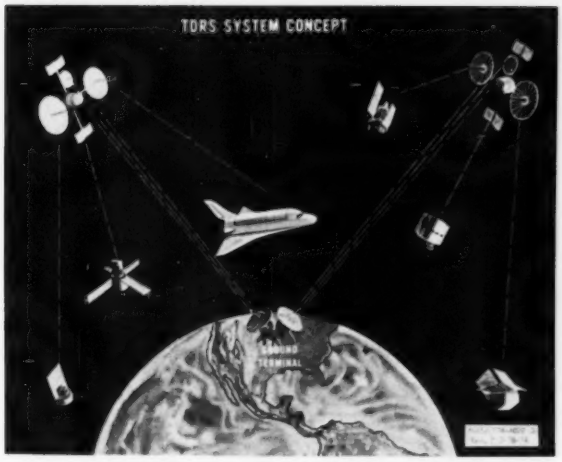
In addition to studying the processes controlling the Earth's atmosphere, ionosphere and magnetosphere, this manned scientific laboratory will conduct experiments in plasma physics in the gravity-free environment surrounding the Spacelab.

The laboratory unit experiments will involve active and passive probing techniques. Missions flown to date have used primarily passive instrumentation which has simply measured the characteristics of these dynamic processes.

With the use of active experiments such as electron accelerators and high-power transmitters, the AMPS payload will be able to perturb momentarily the atmosphere and magnetosphere and measure the resulting reactions. With its orbit in the ionosphere at an altitude of a few hundred kilometers, the Shuttle/Spacelab will be ideally placed to probe extensive regions of Earth's atmosphere and magnetosphere.

Operation will be patterned after other national research facilities such as large ground-based telescopes. Scientists will be able to use the facility equipment furnished by NASA and have their own specialized equipment installed to personally conduct their experiments in space. They will work within the Spacelab or the orbiter cabin in a "shirtsleeve" environment, and control instruments which are externally mounted and exposed to the surrounding space. As many as four scientists will be able to work within the Spacelab payload unit on each mission.

During the definition study phase of the laboratory unit program, the Marshall Center will work closely with a science group chosen last year by NASA. The group consists of 49 scientists from the United States, Canada, England, France, Germany, Italy, Norway, Sweden and Japan.



Satellite Tracking System Proposals Sought by NASA

NASA has issued a request for proposals for the procurement of telecommunication services to be provided by a Tracking and Data Relay Satellite System (TDRSS) developed and operated by industry to meet NASA service requirements.

The system will consist of two specialized relay satellites placed in synchronous Earth orbit and a ground terminal in continental United States. It will provide at least 85 percent coverage as compared to the present 15 percent average coverage of an orbital satellite by the current ground tracking system.

To be operated over a 10-year period beginning in late 1979, the network will become an integral part of the NASA space flight tracking and data network operation. It will permit closing many of the ground stations and associated communication circuits currently required for support of Earth-orbital missions in the space flight tracking and data network, achieving significant savings.

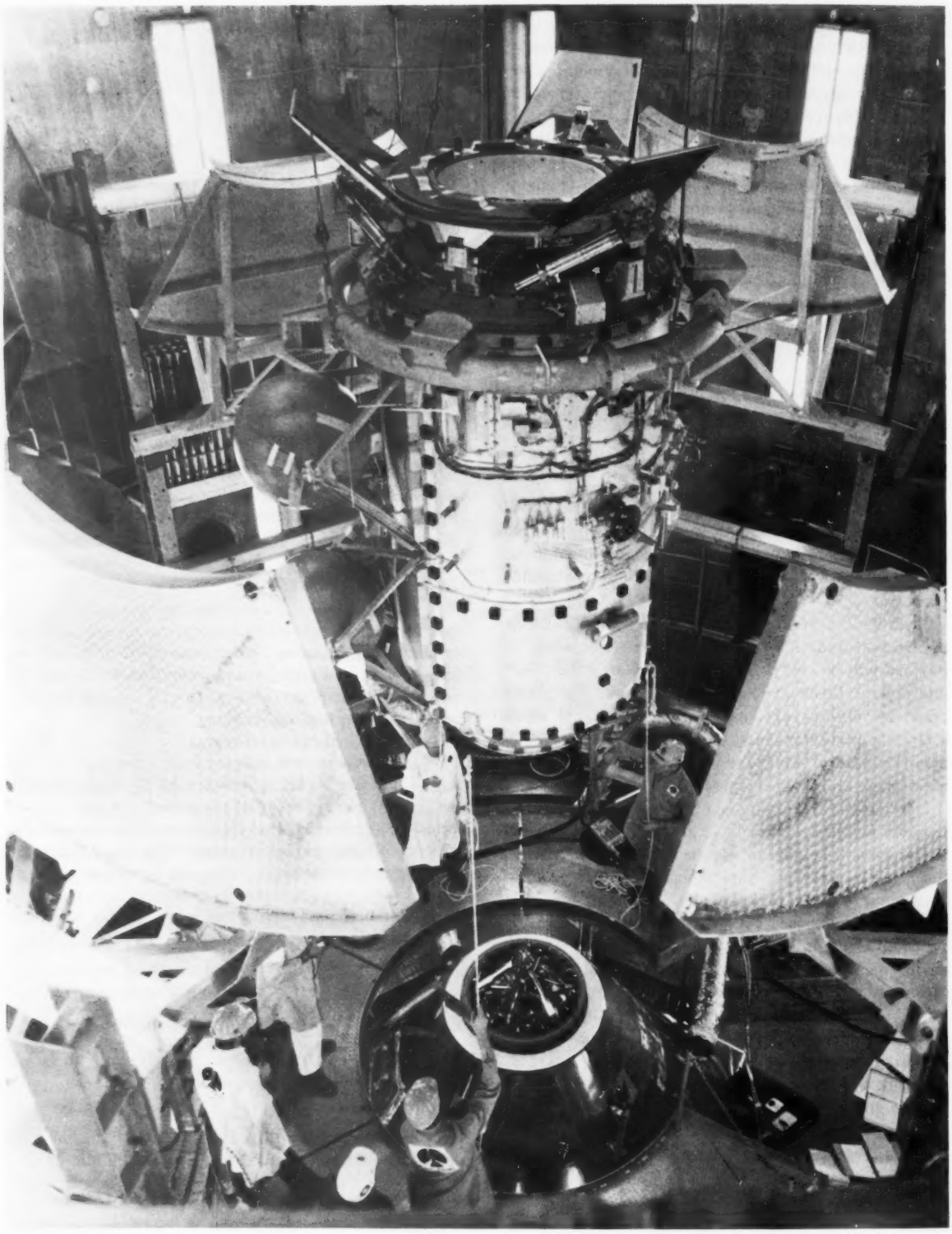
All Earth orbital spacecraft below approximately 5,000 kilometers, including the Space Shuttle, Spacelab and the free-flying automated spacecraft of the 1980s, will be supported by the system.

External Tank Production Contracted

NASA has issued a definitized contract to the Martin Marietta Corp, for the design, development and test of the Space Shuttle External Tank (ET).

The $152,565,000 cost-plus-award-fee type contract is for Increment I of the ET project, including design, development and test, maximum production rate of 24 ETs per year and delivery of major ground test articles and six flight model units.

Period of performance is Sept. 1, 1973, through June 30, 1980. Initial work in the program was done under a letter contract.



Preparing for Roll Out—At the Kennedy Space Center, mating of the Apollo Soyuz Test Project (ASTP) Apollo command module with the docking module is being completed for the roll out March 24 of the Saturn 1B launch configuration.

Tenney Johnson Moves to ERDA

R. Tenney Johnson, NASA's General Counsel, has accepted an appointment to serve in a similar capacity for the Energy Research and Development Administration, effective Feb. 16.

After his departure, S. Neil Hosenball, Deputy General Counsel, began serving as Acting General Counsel.

Commenting on Johnson's change of jobs, Dr. James C. Fletcher, NASA Administrator, said: "Mr. Johnson has served as NASA's General Counsel since May, 1973. During that time, NASA was fortunate in having him as its Counsel, and Dr. Low and I have relied heavily on his wise advice."

Before coming to NASA, Johnson was General Counsel for the Civil Aeronautics Board. Prior to that, he served as Deputy General Counsel for the Department of the Army and later for the Department of Transportation.

Further Teleoperator Studies

The Marshall Space Flight Center has issued two contracts to the Martin Marietta Corp. for further studies on an Earth Orbiting Teleoperator system (EOTS).

The EOTS is to be an unmanned, remotely-controlled spacecraft which will operate in Earth orbit near the Space Shuttle Orbiter. Equipped with manipulator arms, it will enable astronauts to perform tasks outside their spacecraft without the necessity of going into space in pressurized suits.

The total system would be free-flying, controlled either from the Orbiter or possibly the ground, would carry a television camera for close-up inspection, have a docking capability, and be propelled by cold gas expulsion through 16 thrusters.

Lunar Sample Exhibits

The following is a schedule of lunar sample exhibits from March 15 to April 15, 1975:

California—Roseville Rock Rollers Gem and Mineral Show, Roseville, March 29–30.
Illinois—Augustana College, Rock Island, March 31–April 12.
North Carolina—NASA Total Impact Program, Salisbury, March 17–21.
Texas—Houston Museum of Natural Science/History, End of Caroline at Hermann Park, Houston, March 14–April 15.

Long Term Displays

Alabama—Alabama Space and Rocket Center, Marshall Space Flight Center, Huntsville.
Florida—Visitor Information Center, Kennedy Space Center.
Kansas—Eisenhower Library, 200 SE 4th Street, Abilene.
New York—United Nations Building, New York City.
Ohio—U.S.A.F. Museum, Wright Patterson AFB.
Texas—Johnson Library, University of Texas, Austin; Visitor Information Center, Johnson Space Center, Houston.
Virginia—Visitor Information Center, Langley Research Center, Hampton.
Washington, DC—National Geographic Museum; Smithsonian Institution, National Air and Space Museum, 1000 Jefferson Drive; Washington National Cathedral.

Headquarters Press Release

(Issued by the Public Information Division, Code FP, Headquarters, Washington, DC 20546. These releases are available only to members of the news media.)

75–24 High-Speed Computer Yielding Stellar Secrets
75–25 Dr. Fletcher and Mayor Beame Review Co-op Efforts
75–26 Note to Editors: 7th Intelsat IV Launch Delayed
75–27 Note to Editors: SMS-B Delayed
75–28 NASA Assigns Spacelab Payload Study to Marshall Center
75–29 Note to Editors: Shuttle Payloads Briefing
75–30 Earth Resources Symposium at Houston
75–31 LANDSAT-2 Ready to Begin Space Operations
75–32 NASA's R.T. Johnson New General Counsel for ERDA
75–33 Note to Editors: Life Sciences Press Briefing
75–34 Cosmonauts in U.S. for ASTP Training
75–35 NASA Plans Black History Week Observance
75–36 NASA Administrator's Statement on Black History Week
75–37 NASA Seeks Proposals for Satellite Tracking System
75–38 NASA Briefs Industry on Solar Photovoltaic Energy
75–40 Ceremony to Mark Issuance of Pioneer-Jupiter Stamp
75–42 Viking Fact Sheet
75–43 Note to Editors: Administrator's Note to Soviets on Soyuz 17
75–44 Nuclear System that Burns Its Own Wastes Shows Promise
75–45 OTDA Fact Sheet
75–46 Solar Probe Begins Seventh Year in Space
75–47 Intelsat IV Launch Failure

New NASA Publications

Pioneer Odyssey: Encounter with a Giant is a lucid account of the Pioneer 10 mission to Jupiter. It was prepared at the Ames Research Center by Richard O. Finnel, William Swindell and Eric Burgess and is illustrated in color. The publication describes both the planet and the spacecraft and includes suggestions for further reading. Paperbound copies are available for $5.50 each from the Superintendent of Documents, Government Printing Office, Washington, DC 20402. (NASA SP-349)

The Rings of Saturn, edited by Frank Don Palluconi of JPL and Gordon H. Pettengill of M.I.T., reports proceedings at the JPL workshop in which the Mariner Jupiter/Saturn 77 project was emphasized. The papers presented and discussions transcribed deal with the nature of Saturn's rings, the hazards to spacecraft, instrumentation, and recommendations for fruitful observations and analyses. Paperbound copies are available for $3.25 each from the Superintendent of Documents, Government Printing Office. (NASA SP-343)

(The Technology Utilization Office, NASA Headquarters)
(The following is a listing of published NASA Tech Briefs. Inquiries concerning them should be directed to the TU Office of the originating NASA Center.)

Innovator(s)	*Title*	*Number*	*Center*
G. A. Almasi, R. J. Hendel, R.E. Horstmann, T. F. Jamba, Jr., G. E. Keefe, S. Krongelb, J. V. Powers, L. T. Romankiw and L. L. Rosier, IBM Corp.	Fabrication of Magnetic Bubble Memory Overlay	B73-10096	MSFC
Kemp L. Parrish, LaRC	Smoke Generator	B73-10414	LaRC
D.L. Alger, R. Steinberg and P. Weisenbach, LeRC	A High Yield Neutron Target	B74-10066	LeRc
Alex Vary, LeRC	Guidebook of Nondestructive Evaluation Techniques for Materials and Structures	B74-10122	LeRC
R. C. Hendricks, I. C. Peller and A. K. Baron, LeRC	Computer Program for Calculating Water and Steam Properties	B74-10123	LeRC
James F. Morris, LeRC	Binary Alloys for Refractory-Metal Brazing	B74-10125	LeRC
Donald H. Menzel, Geophysics Corporation of America	Spectrometer	B74-10181	GSFC
Michael W. Fitzmaurice and James B. Abshire, GSFC	Dynamic Polarization Compensating System for Optical Communications Receiver	B74-10182	GSFC
L. J. Owens, KSC	Artificial Limb Connection	B74-10183	KSC
A. Sidney Roberts, Jr., Old Dominion University	Calorimetric Detection of Neutral-Atom Content of Ion Beam	B74-10184	LaRC
Thomas J. Ormiston and R. A. Tanzilli, General Electric Co.	Process for Fabrication of Stabilized Aluminum Phosphate Fibers	B74-10185	LaRC
Melvin S. Anderson and Walter L. Heard, Jr., both of LaRC, and Ming M. Chen, Boston University	Computer Program for Structural Analysis of Layered Orthotropic Ring-Stiffened Shells of Revolution (SALORS): Linear Stress Analysis Option	B74-10186	LaRC
James C. Patterson, Jr., LaRC	Flight Tests of Vortex-Attenuating Splines	B74-10187	LaRC
Stacey M. Mills and Judd R. Wilkins, LaRC	Automated Single-Slide Staining System	B74-10188	LaRC
J. D. Collins, G. C. Hart, T.K. Hasselman, B. Kennedy and H. Pack, Jr., J. H. Wiggins Co.	Model Optimization Using Statistical Estimation	B74-10189	MSFC
J. C. Browne, T. Davis, A. Haller, M. Henneman, R. Kleir and G. L. Lasseter, Information Research Associates	FORTRAN Automatic Code Evaluation System (FACES)	B74-10190	MSFC
E. J. Nossen and E. R. Starner, RCA Corp.	Reduction of Quantization Error in Measurement of Frequency	B74-10191	JSC
E. J. Stringer, Rockwell International Corp.	Microelectronics Packaging Technique: A Concept	B74-10192	JSC
J. A. Stein, Rockwell International Corp.	Automatic Soldering Machine	B74-10193	JSC
Vincent J. Menichelli and Lien C. Yang, Caltech/JPL	Laser System to Detonate Explosive Devices	B74-10194	NaPO
Louis F. Schmidt, Caltech/JPL	Improved Xenon Lamp for Solar Simulators: A Concept	B74-10195	NaPO
Mark Anderson, Northrop Corp./Electronics Division	Heart-Rate Pulse-Shift Detector	B74-10196	ARC
Robert D. Lee, Robert J. Hudock and Dale I. Shute, ARC	Reference Apparatus for Medical Ultrasonic Transducer	B74-10197	ARC
Herbert A. Lassen and Jorge H. Decanini, TRW Systems Group, TRW, Inc.	Spacecraft Attitude Determination by Fanscan Technique	B74-10198	ARC
Bernard Rubin and James D. Childress, Electronics Research Center	New Tooth Enamel from Brushite Crystals	B74-10199	ERC

NASA TECH BRIEFS—Cont.

Edward A. Beaver and Carl E. McIlwain, University of California	Digital Multichannel Photometer	B74–10200 Hdqrs.
Laurence J. Bement, LaRC	Apparatus for Monitoring Linear Explosive Performance	B74–10201 LaRC
Edward L. Rakowsky and Vincent P. Marchese, The Singer Co.	Ignition of Sounding Rocket Motors with Hand-Pumped Air	B74–10202 LaRC
A. V. Viswanathan and M. Tamekuni, The Boeing Co.	Computer Program for Buckling Loads of Orthotropic Laminated Stiffened Panels Subjected to Biaxial In-Plane Loads (BUCLASP 2)	B74–10203 LaRC
A. V. Viswanthan, M. Tamekuni and L. L. Tripp, The Boeing Co.	Computer Program for Stresses and Buckling of Heated Composite-Stiffened Panels and Other Structures (BUCLASP 3)	B74–10204 LaRC
David Bushnell, Lockheed Missiles and Space Co.	Computer Program for Stress, Stability and Vibration of Complex Branched Shells of Revolution: BOSOR 4	B74–10205 LaRC
D. R. Ferguson, P. H. Heck, J. S. Keith, D. J. Lahti and C. L. Merkle, General Electric Co.	Computer Program for Streamtube Curvature Analysis: Analytical Method	B74–10206 LaRC
H. Ziegler, Northrop Corp.	Investigation of Exit-Velocity Stratification Effects on Jets in a Crossflow (STRJET)	B74–10207 LaRC
Reginald J. Exton, LaRC	Visualization of Smoke Stack Plume	B74–10208 LaRC
Stanley Butman and Uzi Timor, Caltech/JPL	Interplex Modulation and a Suppressed-Carrier Tracking Loop for Coherent Communications Systems	B74–10209 NaPO
Harold E. Marsh, Jr., Caltech/JPL	Polymers Used to Absorb Fats and Oils: A Concept	B74–10210 NapO
William H. Gayman, Caltech/JPL	Fluid Dynamics Test Method	B74–10211 NaPO
Lloyd J. Derr, Caltech/JPL	Ultrasonic Scanner for Footprint Identification	B74–10212 NaPO
Charles F. Campen, Jr., Caltech/JPL	Automated Drug Identification System	B74–10213 NaPO
James C. Arnett, Caltech/JPL	Side Wire Feed for Welding Apparatus	B74–10214 NaPO
K. K. Gupta, Caltech/JPL	Eigenvalue Algorithm Based on a Combined Sturm Sequence and Inverse Iteration Technique (EASI)	B74–10215 NaPO
Bruce D. Marcus, TRW Systems Group, TRW, Inc.	Heat Pipe with Hot Gas Reservoir	B74–10216 ARC
Durk J. Pearson, TRW Systems Group, TRW, Inc.	System for Measuring Transients in Fluid Flow	B74–10217 ARC
Bernard A. Birnbaum and Norman Bilow, Hughes Aircraft Co.	Metallized Polymeric Foam Material	B74–10218 ARC
Norman Billow, Hughes Aircraft Co.	Moisture-Resistant Baffle Material for Fuel Tanks	B74–10219 ARC
Phillip D. Quattron, ARC	Spacecraft Oxygen Recovery System	B74–10220 ARC
Marnix F. E. Dillenius, Michael R. Mendenhall and Selden B. Spangler, Nielsen Engineering and Research, Inc.	Calculation of Aerodynamic Characteristics of STOL Aircraft	B74–10221 ARC
Howard G. Nelson, ARC	Evaluation of Test Procedures for Hydrogen Environment Embrittlement	B74–10222 ARC
W. E. Perry, JSC	Field-Sequential Stereo Television	B74–10223 JSC
F. R. Minton and U. O. Graham, Rockwell International Corp.	Inspection of Transparent Surfaces Using Photosensitive Paper	B74–10224 JSC
Grace L. Picciolo and Emmett W. Chappelle, GSFC	Improved Methods for Counting Bacteria in Physiological Fluids	B74–10231 GSFC
P. Gorenstein and B. Harris, American Science and Engineering, Inc.	Compact Source of Soft X-Rays	B74–10232 Hdqrs.
Wilbur C. Heier, LaRC	Laminating Cored, Stressed-Face, Sandwich Structures	B74–10233 LaRC

J. L. Halsor and H. C. Lin, Westinghouse Electric Corp.	A Method for Polycrystalline Silicon Delineation Applicable to a Double-Diffused MOS Transistor	B74-10234	LaRC
A. R. Gandy, Northrop Corp.	Environmental Control and Waste Management System Design Concept	B74-10235	LaRC
Sanford Dash, Paul del Guidice, Antonio Ferri and Gerald Roffe, Advanced Technology Laboratories, Inc.	Numerical Program for Analysis of Three-Dimensional Supersonic Exhaust Flow Fields (CHAR 3D)	B74-10236	LaRC
E. J. Minter and V. P. Caruso, MSFC	Mechanical Rod Peening	B74-10237	MSFC
W. N. Clotfelter and E. R. Risch, MSFC	Nondestructive Testing of Railroad Wheels and Rails by Ultrasonics	B74-10238	MSFC
J.H. Martin, Charles Starke Draper Laboratory, Inc.	Improved Circuit-Board Interconnectors	B74-10239	JSC
M. Simmonds, ATO, Inc.	A Band Clamp with a Spring Toggle Lever	B74-10240	JSC
Maxwell G. Strange, GSFC	Implementation of a Self-Controlling Heater: A Concept	B74-10241	GSFC
James F. McChesney, Jr., GSFC	High-Voltage Distributors	B74-10242	GSFC

PATENTS FOR INVENTIONS RESULTING FROM NASA RESEARCH

(The Office of General Counsel, NASA Headquarters, announces that the following U.S. patents have been issued by the U.S. Patent Office to NASA for inventions resulting from NASA research. Inquiries concerning them should be directed to the attention of the NASA Patent Counsel for the indicated installation.)

Inventor(s) and Employer	*Title and NASA Docket*	*Patent No.*	*Installation*
John D. Deluca, NASA/GSFC	Bonding of Sapphire to Sapphire by Eutectic Mixture of Aluminum Oxide and Zirconium Oxide (GSC-11,577-1)	3,859,714	GSFC
Raymond L. Gause, NASA/MSFC	Ergometer Calibrator (MFS-21,045-1)	3,859,840	MSFC
James T. Sawyer, NASA/MSFC	A Leak Detector (MFS-21,761-1)	3,859,845	MSFC
Frank J. Nola, NASA/MSFC	A Variable Frequency Inverter for AC Induction Motors with Torque, Speed and Braking Control (MFS-22,088-1)	3,860,858	MSFC
Hubert Erpenbach, Cal/tech/JPL Pasadena, CA	Method of Producing a Storage Bulb for an Atomic Hydrogen Maser (NPO-13,050-1)	3,859,119	NaPO
Paul R. Hill and David F. Thomas, Jr., NASA/LaRC	Kinesthetic Control Simulator (LAR-10,276-1)	3,859,736	LaRC
Gordon E. Wood, Caltech/JPL	Simultaneous Acquisition of Tracking Data from Two Stations (NPO-13,292-1)	3,860,921	NaPO
Kenneth L. Orloff, George R. Grant and William D. Gunter, Jr., NASA/ARC	Dual Wavelength Scanning Doppler Velocimeter (ARC-10,637-1)	3,860,342	ARC

Projected Launch Schedule

(As of February, 1975)

Name	*Launch Date*	*Vehicle*	*Range*	*Mission Remarks*
GEOS-C	April	Delta	WTR	Oceanographic and geodetic satellite to measure ocean topography, sea state, and other features of the Earth.
SAS-C	May 7	Scout	SM	Third in a series of small astronomy satellites to survey the celestial sphere and search for sources radiating in the X-ray, gamma ray, ultra-violet and other spectral regions both inside and outside our galaxy.
Telesat-C	May 16	Delta	ETR	Third in a series of Canadian Communications satellites to provide television, voice, data and other communications throughout Canada. Reimbursable.
Nimbus-F	June	Delta	WTR	Experimental meteorological satellite to test instruments for expanding capabilities for remote sensing of the atmosphere.
Marisat-A	June	Delta	ETR	Comsat Corp, satellite to provide maritime satellite communications service. Reimbursable.
OSO-I	June	Delta	ETR	Scientific satellite to investigate a variety of specific features of the Sun.

PROJECTED LAUNCH SCHEDULE—Cont.

Intelsat IV F1	May	A-Centaur	ETR	Continuation of Intelsat series of synchronous satellites providing commercial global telecommunications service to members of the International Telecommunications Satellite Consortium. Reimbursable.
SMS-C/GOES-A	June	Delta	ETR	First operational synchronous meteorological satellite of the National Weather Service of the Department of Commerce to provide continuous day and night global cloud-cover observations. Under study.
ASTP	July 15	Saturn 1B	ETR	The U.S. launch for the U.S.-Soviet manned space flight. American astronauts in an Apollo Spacecraft will rendezvous and dock with Soviet cosmonauts in an orbiting Russian Soyuz spacecraft to test a new universal docking system and to conduct joint and unilateral experiments.
ITOS-E2	July	Delta	WTR	Operational meteorological satellite of the National Weather Service to provide day and night cloud cover imagery. Reimbursable.
Relativity (Gravity Probe)	July	Scout	WI	Scientific satellite to make a test of Einstein's Theory of Relativity.
COS-B	3rd qtr.	Delta	WTR	European scientific satellite to study extraterrestrial gamma radiation. Reimbursable.
Atmosphere-D	Sept	Delta	WTR	A scientific satellite to investigate the chemical processes and energy transfer mechanisms which control Earth's atmosphere.
Atmosphere-E	Sept.	Delta	ETR	A scientific satellite to investigate the chemical processes and energy transfer mechanisms which control Earth's atmosphere.
Marisat-B	3rd. Qtr.	Delta	ETR	Second Comsat Corp. Satellite to provide maritime satellite communications services. Reimbursable.
Symphonie-B	3rd.Qtr.	Delta	ETR	Second joint French/German experimental communications satellite designed for TV, telephone, and data transmission. Reimbursable.
Viking-A	3rd Qtr.	TIII-Centaur	ETR	Planetary mission to explore Mars from orbit around the planet with a capsule on its surface.
Viking-B	3rd Qtr.	TIII-Centaur	ETR	Planetary mission to explore Mars from orbit around the planet with a capsule on its surface.
Intelsat IVA-A	3rd Qtr	A-Centaur	ETR	First of a series of improved Intelsat Consortium satellites that will have almost double the capacity of the present Intelsat IV satellites. Reimbursable.
Dual Air Density	Nov.	Scout	WTR	Two scientific spacecraft will be placed in orbit to obtain simultaneously measurements of the composition of upper and lower levels of the atmosphere.
RCA-A	4th Qtr	Delta	ETR	First of a series of domestic communications satellites for RCA. Reimbursable.
CAS-C/CT	4th Qtr	Delta	ETR	Canadian-U.S. cooperative experimental communications satellite to develop and test the technology of high-power satellite communications systems.
Intelsat IVA-B	4th Qtr.	A-Centaur	ETR	Second of a series of improved Intelsat Consortium satellites. Reimbursable.
CDCS-A	4th Qtr.	A-Centaur	ETR	Domestic communications satellite for Comsat Corp. Reimbursable.
Marisat-C	1975	Delta	ETR	Comsat Corp. satellite to provide maritime satellite communications services.
1976				
HELIOS-B	Jan.	TIII-Centaur	ETR	Second West German/NASA cooperative satellite to investigate the properties of the processes in interplanetary space close to the Sun.
RCA-B	1st. Qtr.	Delta	ETR	Second domestic communications satellite for RCA. Reimbursable.
NATO-C	1st Qtr.	Delta	ETR	Communications satellite in synchronous orbit to perform communications relay for NATO. Reimbursable.
LAGEOS	1st Qtr.	Delta	WTR	Demonstrate relevant space techniques that will contribute to the development and validation of predictive models for earthquake hazard alleviation, ocean-surface conditions and ocean circulation.
CDCS-B	1st Qtr.	A-Centaur	ETR	Second domestic communications satellite for Comsat. Reimbursable.
Intelsat IVA-C	1st Qtr	A-Centaur	ETR	Third of a series of improved Intelsat Consortium satellites.

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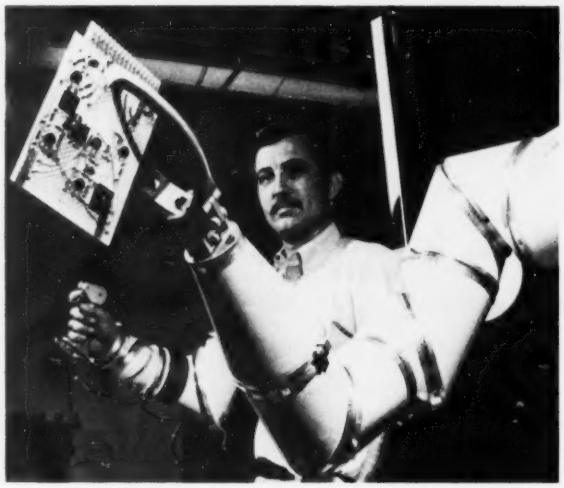
Device to Duplicate Human Arm Movements

Advanced space suit research conducted at Ames Research Center has led to the development of an experimental, arm-like device that can duplicate the movements of a human "master" arm.

It is called an exoskeletal arm and uses a complex system of electronic devices.

Linked to a computer, it is expected to have application as a therapeutic aid to help the neurologically handicapped, particularly patients suffering from cerebral palsy. Thus employed, it could eliminate electronically irregular arm motions and, by so doing, facilitate self-feeding and other personal functions.

Another possible application of the device is as an aid to patients undergoing physical therapy for muscle deterioration. By using a preprogrammed computer attended by a single therapist, a series of powered arms could be used in a clinic to provide therapy for several patients simultaneously.



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